



## Prevalence of cigarette smoking and its related factors among Iranian male workers

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### Abstract

**Background:** Smoking is considered as the second leading risk factor of early death and disability throughout the world. Smoking is the second leading risk factor of early death and disability in the world. The workplace is an important setting for the implementation of cigarette smoking prevention and control interventions. This study aimed to determine the prevalence of cigarette smoking and related factors by focusing on ADHD and risk-taking behaviors among a sample of Iranian workers.

**Methods:** This cross-sectional study was conducted on 2434 male workers of Kaveh Industrial City in Saveh. Random cluster sampling was used in the selection of workers. All workers completed five sets of anonymous and validated questionnaires. ADHD was measured by Conner's Adult ADHD Rating Scales. Data analysis was done using chi-square, independent t-test and logistic regression model in STATA 10. Also, P-value <0.05 was considered statistically significant.

**Results:** The mean age of the workers was 32.80±7.05 years. The prevalence of cigarette smoking in the lifetime, last year, last month, and daily or almost daily in the last month were 26.2%, 20.6%, 18.5%, and 13.1% respectively. After adjustment, age (OR=1.08), sensation seeking (OR=1.57), hookah smoking (OR=4.21), alcohol use (OR=2.51), sexual risk behaviors (OR=2.25), religiosity (OR=0.95) and self-esteem (OR=2.02) were associated with cigarette smoking.

**Conclusion:** Our results showed that 13.1 % of workers were regular smokers (daily or almost daily). Specific programs in workplaces, including interventions to enhance self-esteem and reduce anxiety, can be effective in lowering cigarette smoking prevalence. Also, comprehensive interventions to reduce or prevent different risk-taking behaviors can be considered as elements of preventive action plans.

**Keywords:** Cigarette smoking, Risk taking behaviors, ADHD, Male workers

**Conflicts of Interest:** None declared

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### ↑What is “already known” in this topic:

Workers usually expose to occupational hazards, which can have adverse health effects. Furthermore, additional workplace stress and dissatisfaction might contribute to increased smoking. Actually, cigarette smoking may be a way of coping with these situations to get short term relief. There are some factors like cognitive, neurobiological and genetic ones that can play key roles in the ADHD-cigarette smoking association. But this association mostly assessed among children and adolescents in the world generally and especially in Iran. In Iran, some studies reported adult ADHD prevalence among specific populations like university students and prisoners.

### →What this article adds:

- Almost 13 % of workers were regular smokers (daily or almost daily).
- A higher score of religiosity had a protective effect on cigarette smoking.
- There was a co-occurrence of risk-taking behaviors among workers.
- ADHD and anxiety didn't show a significant effect on cigarette smoking.

## Introduction

According to the World Health Organization (WHO) report in 2015, over 1.1 billion people smoked tobacco. Based on this report, there is a declining trend in the prevalence of tobacco smoking in many countries, but tobacco smoking appears to be increasing in the Eastern Mediterranean and the Africa region (1). Also smoking reported as a second leading risk factor of early death and disability throughout the world in 2015 (2).

Based on the Global Burden of Disease Study (GBD) in 2015, it is estimated that the prevalence of daily smoking was 25.0% in the world (3). In Iran, based on national surveys, the prevalence of cigarette smoking reported as 12.3% to 27.7% in men (4).

Workers usually expose to occupational hazards, which can have adverse health effects. Furthermore, additional workplace stress and dissatisfaction might contribute to increased smoking. Actually, cigarette smoking may be a way of coping with these situations to get short term relief (5). From the public health view, the workplace is an important setting for the implementation of cigarette smoking prevention and control interventions. These interventions include anti-tobacco messages, tobacco-free laws covering worksites and comprehensive coverage for cigarette cessation treatments for workers. Prior studies showed the effectiveness of smoke-free workplace policies (6-8).

There is no worldwide estimation of cigarette smoking among workers, but in some countries like the U.S there are several studies that reported smoking prevalence among this stratum. For example, Giriya et al. reported that among workers in the construction industry, 24.4% were cigarette smokers (6). In some Asian countries, there are some studies about cigarette smoking among workers. For example, the current prevalence of cigarette smoking reported as 50.6% in manual workers in Korea (9).

Most of the previous research focused on the association between smoking and comorbid psychiatric disorders. For example, it is indicated that the prevalence of cigarette smoking among individuals with a history of comorbid psychiatric diagnosis is significantly higher than this rate in the general population (10, 11). ADHD is one of the most prevalent mental health disorders in childhood and it is estimated that it occurs among 4-5% of adults (12, 13). There are some factors like cognitive, neurobiological and genetic ones that can play a key role in the ADHD-cigarette smoking association (14). But this association mostly assessed among children and adolescents in the world generally and especially in Iran. In Iran, some studies reported adult ADHD prevalence among specific populations like university students (15) and prisoners (16), but to the best of authors' knowledge, there is no information about the association between cigarette smoking and ADHD in Iranian adults especially workers.

The information about the cigarette smoking prevalence in workers can be useful in designing programs for preventing the development of smoking in this high-risk population.

Unfortunately, there is limited information on cigarette smoking and its related factors in workers in Iran. This study aimed to determine the prevalence of cigarette smoking and identify some factors related to cigarette smoking by focusing on ADHD and risk-taking behaviors among a sample of Iranian workers.

## Methods

### Study population and sampling framework

The present cross-sectional study was conducted from October 2017 to February 2019. In this study, a sample of 2434 workers was chosen by random cluster sampling from Kaveh Industrial City in Saveh.

All workers of the Kaveh Industrial City were eligible to enter into this study. The needed information collected through interviews and questionnaires. Before data collection, trained interviewers presented some explanations about the aims of the study, anonymity of the questionnaires, and voluntary nature of the participation in the study. Also, workers were asked not to write any personal information in the questionnaires. All workers had signed an informed consent form.

The questionnaire aimed to obtain information on cigarette and hookah smoking, alcohol use, illicit drug use, sexual risk behaviors, religious beliefs, ADHD, anxiety, and self-esteem as well as demographic information.

The first part of this questionnaire was prepared based on Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) developed by the WHO with consideration of the current status of substance use in Iran. This questionnaire was validated by a group of researchers previously (17, 18).

The Persian version of Conner's Adult ADHD Rating Scales (The self-reported short version, PCAARS-S; SV) was used to collect data about ADHD status among workers. This questionnaire was validated by Sadeghi-Bazargani et al. and used to screen for adult ADHD in Tabriz, northwest of Iran (19).

Self-esteem was measured by the Persian version of the Rosenberg questionnaire (20). The participants were asked to choose one of the following responses: "1) strongly agree, 2) agree, 3) disagree, and 4) strongly disagree. Half of the questions were "negative" and reversely scored. The minimum and maximum possible values of this questionnaire were 10 and 40 respectively. In this scoring, higher scores indicate greater self-esteem.

Anxiety was measured using the Beck Anxiety Inventory (BAI). This questionnaire is a self-report assessment of anxiety symptoms and includes 21 items rated on a 4-point Likert scale from 0 (not at all) to 3 (severely). The validity and reliability of the Persian version of this questionnaire were done by Kaviani and Mousavi (21).

Sensation seeking was assessed using the question "Do you enjoy doing things that are dangerous or risky?" workers who answered "yes" were considered as engaging in sensation seeking.

**Statistical analysis**

The prevalence of cigarette smoking was reported with a 95% confidence interval (CI). For cigarette and hookah smoking, sexual risk behavior, and alcohol use, the last year was considered, while for illicit drug use lifetime use was considered for statistical analysis. To perform simple statistical analysis, chi-square and independent t-test were used. For estimation crude odds ratios and adjusted ones, univariate and multiple logistic regression models were used respectively. The hosmer-Lemeshow guideline was used for variable selection in a multiple model (22). All analyses were done using STATA 10 with considering

survey analysis. P-value >0.05 was considered statistically significant.

**Results**

This study indicated that the mean age of the workers was found to be 32.80±7.05 (range: 18-67) years. Among all workers, 716 (29.4%) of them had academic education and only 38 (1.6%) were illiterate. Most of the workers were married and only 58 (2.4%) of workers had self-injury experience. Also, 505 (20.7%) of workers reported that they have sensation seeking.

As shown in Table 1, the lifetime, last year, last month

**Table 1.** Prevalence of Cigarette smoking in a sample of Iranian workers

Cigarette smoking pattern	Total (n=2434)	
	N (%)	95% CI <sup>a</sup>
Lifetime use		
No	1796 (73.8)	72.04-75.53
Yes	638 (26.2)	24.46-27.95
last year use		
No	1933 (79.4)	77.81-81.02
Yes	501 (20.6)	18.97-22.18
last month use		
No	1983 (81.5)	16.98-20.07
Yes	451 (18.5)	79.92-83.01
Daily or almost daily use in last month		
No	2114 (86.9)	85.51-88.19
Yes	320 (13.1)	11.80-14.48

\* CI: Confidence interval

**Table 2.** Demographic characteristics and risk-taking behaviors by last year cigarette smoking in a sample of Iranian workers

Characteristics	Cigarette smoking (Last year)			p
	No n (%)	Yes n (%)	Total n (%)	
Education				
Non academic	1302 (76.7)	395 (23.3)	1697	<0.001
Academic	614 (85.8)	102 (14.2)	716	
Marital status				
Single	537 (81.9)	119 (18.1)	656	0.079
Married	1382 (78.6)	376 (21.4)	1758	
Sensation seeking				
No	1595 (83.4)	317 (16.6)	1912	<0.001
Yes	325 (64.4)	180 (35.6)	505	
Experience of self-injury				
No	1896 (80.3)	464 (19.7)	2360	<0.001
Yes	25 (43.1)	33 (56.9)	58	
Hookah smoking (last year)				
No	1579 (87.3)	229 (12.7)	1808	<0.001
Yes	354 (56.5)	272 (43.5)	626	
Alcohol use (last year)				
No	1823 (83.2)	367 (16.8)	2190	<0.001
Yes	110 (45.1)	134 (54.9)	244	
Sexual risk behavior (last year)				
No	1895 (80.4)	462 (19.6)	2357	<0.001
Yes	38 (49.4)	39 (50.6)	77	
Illicit drugs use (lifetime) <sup>a</sup>				
No	1877 (82.1)	410 (17.9)	2287	<0.001
Yes	56 (38.1)	91 (61.9)	147	
ADHD				
No	1793 (80.4)	438 (19.6)	2231	<0.001
Yes	126 (67.4)	61 (32.6)	187	
Anxiety				
No	1389 (82.5)	294 (17.5)	1683	<0.001
Yes	535 (72.7)	201 (27.3)	736	
Self-seem				
No	1834 (80.4)	447 (19.6)	2281	<0.001
Yes	83 (62.4)	50 (37.6)	133	
Age, mean (SD)	32.22±6.79	35.03±7.57	2387	<0.001
Religiosity, mean (SD)	13.66±2.08	12.72±3.00	2100	<0.001

<sup>a</sup> Cannabis or ecstasy or amphetamine and methamphetamine or opium or heroin

and daily or almost daily use of cigarette smoking in the last month were 26.2% (95% CI: 24.46-27.95), 20.6% (95% CI: 18.97-22.18), 18.5% (95% CI: 16.98-20.07) and 13.1% (95% CI: 11.80-14.48) respectively.

The distribution of the last-year cigarette smoking by ADHD, risk-taking behaviors and some related factors are illustrated in Table 2. The results indicated that education, sensation seeking, the experience of self-injury, hookah smoking, alcohol use, sexual risk behavior, illicit drug use, age, ADHD index, anxiety, religiosity and self-esteem were significantly related to cigarette smoking.

A logistic model was used to estimate the crude ORs for all of the variables (Table 3). The results showed that illicit drug use has the highest OR among all variables. This analysis indicated that having ADHD has a significant effect on cigarette smoking in univariate analysis. In the final model, ADHD didn't show any significant effect on cigarette smoking.

To control the possible confounding effect of other variables, we performed multiple logistic models. The result of this analysis showed that after adjustment for other factors, age (OR=1.08), sensation seeking (OR=1.57), hookah smoking (OR=4.21), alcohol use (OR=2.51), sexual risk behaviors (OR=2.25), religiosity (OR=0.95) and self-esteem (OR=2.02) were associated with cigarette smoking.

## Discussion

In this study, the lifetime, last year, last month, and daily or almost daily prevalence of cigarette smoking was found to be 26.2, 20.6, 18.5, and 13.1% respectively. In the National Health Interview Survey (NHIS) study among U.S adults, the prevalence of current smoking in males was found to be 17.5% in 2016 (23). The prevalence of daily, regular and current cigarette smoking reported as 15, 16 and 18% among the Australian adults in 2016 (24). Based on national surveys among adults, the prevalence of current cigarette smoking was found to be 25.6% in 2000, 21.5% in 2005, 24.9% in 2007 and 21.3% in 2011 in Iranian males (25). Based on different target populations, cultural and social norms as well as the difference in the definition of smoking in above-mentioned studies, it isn't logical to compare the finding of the pre-

sent study with these national studies. In spite of the difference in the definition of being smoker and other related factors, the comparison of finding with previous studies among workers seems to be valuable. Current cigarette smoking was reported as 28.1% among workers in a dusty industry in New Jersey in 2016 (26), 57% among industrial workers in Greece in 2006 (27), 50.6% among manual male workers in Korea in 2012 (9), 23.1% among male industrial workers in Brazil in 2001 (28) and 23.4% among male industrial workers in India (29). These broad ranges could be related to lots of factors such as domestic rules about smoking in workplaces, workers attitude about smoking and etc. Overall, it seems that the prevalence of cigarette smoking among Iranian male workers is lower than the other countries. In comparison to the national surveys among Iranian male adults, it seems that this prevalence is lower than general male adults. It should be noted that there is a prohibition of smoking in some workplaces. Also the lower prevalence of cigarette smoking among workers in comparison with general male adults could be related to recruiting process. Because of preventing some disorders and future outcomes, employers prefer to recruit healthier workers (30).

Co-occurrence and co-changing of risk-taking behaviors is one of the most important and effective approaches in the prevention programs. A lot of studies emphasized on the co-occurrence of risk-taking behaviors (31-33). Consistent with previous finding in the literature (34, 35), the present study showed that cigarette smoking strongly associated with other risk-taking behaviors (i.e., hookah smoking, alcohol use, and sexual risk behavior).

A great deal of research showed the association between ADHD and cigarette smoking. Persons with ADHD exhibit a higher prevalence of smoking, initiate smoking at an earlier age, and are more likely to be a regular smoker in comparison with their peers (36-38). Most of these studies were taken among children, adolescents and young adults. Recently a study among Czech adults showed a surprising result. The finding of this study indicated that the prevalence of cigarette smoking was lower among those with higher ADHD score (39). In the present study, although having ADHD was significantly associated with cigarette smoking in univariate analysis, but the results of

Table 3. Logistic regression analysis of the association between "cigarette smoking" and risk-taking behaviors and ADHD in a sample of Iranian workers

Variables	Cigarette smoking(last year)			Adjusted estimation		
	OR	Crude estimation 95%CI	p	OR	95%CI	p
Age (year)	1.06	1.04-1.07	<0.001	1.08	1.07-1.09	<0.001
Marital status (married/single)	1.23	1.00-1.51	0.050	1.18	0.95-1.46	0.104
Education (academic/nonacademic)	0.55	0.45-0.66	0.450	---	---	---
Sensation seeking (yes/no)	2.79	1.99-3.90	0.001	1.57	1.04-2.36	0.037
Experience of self- injury(yes/no)	5.39	2.88-10.08	0.001	1.59	0.54-4.69	0.318
Hookah smoking (last year)	5.30	3.79-7.39	<0.001	4.21	3.12-5.69	<0.001
Alcohol use (last year)	6.05	4.74-7.72	<0.001	2.51	1.54-4.08	0.005
Illicit drug use (lifetime)	7.44	4.28-12.92	<0.001	2.33	0.98-5.51	0.053
Sexual risk behavior (last year)	4.21	1.95-9.09	0.005	2.25	1.07-4.71	0.037
ADHD (yes/no)	1.98	1.09-3.60	0.032	0.61	0.26-1.44	0.200
Religiosity	0.86	0.82-0.91	0.001	0.95	0.91-0.99	0.039
Anxiety (yes/no)	1.77	0.96-3.28	0.062	1.13	0.70-1.82	0.550
Self-esteem (low/normal)	2.47	1.42-4.29	0.008	2.02	1.11-3.65	0.028



the final logistic regression model showed that this variable has no significant association with cigarette smoking. It seems that this association among adults and especially workers need further surveys.

The findings of this study are consistent with several previous research that demonstrated the role of religiosity in the prevention of cigarette smoking (40-42). Religious beliefs can be considered as a marker of risk and could be used along with other related factors to detection and implementation of interventional plans to prevent smoking. It should be noted that although religiosity has been reported to be inversely associated with cigarette smoking, Gillum indicated that people with firmer religious beliefs are more likely to under-report smoking leading to spurious claims (43).

Several aspects of this study can limit the usefulness of the results: first, the cross-sectional nature of the study serves only as a document for the association between independent factors and cigarette smoking status and does not indicate causality. Second, the generalization of the findings is limited to the workers of Kaveh Industrial City. Finally, some other confounders such as other psychiatric disorders were not assessed in this study.

### Conclusion

In this study, we estimated the prevalence of cigarette smoking among workers. Results revealed that 13.1 % of workers were regular smokers (daily or almost daily). The findings highlighted the protective effect of a higher score of religiosity. On the other hand, our study represents the co-occurrence of risk-taking behaviors. Consequently, focusing on specific programs in the workplace including interventions to enhance self-esteem, can be effective in lowering cigarette smoking prevalence. Also, the co-occurrence of risk-taking behaviors needs comprehensive interventions to reduce or prevent different behaviors simultaneously.

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### Conflict of Interests

The authors declare that they have no competing interests.

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